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National Priority Chemicals Trends Report (2000-2004)

Section 4
Chemical Specific Trends Analyses for Priority Chemicals (2000−2004): Anthracene

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Anthracene

Chemical Information:

CAS Number − 120−12−7

Alternate Names − paraNaphthalene, anthracin, anthraxcene

General Uses − This chemical is used to make dyes, plastics, and pesticides. It has been used to make smoke screens and scintillation counter crystals.

Potential Hazards − This chemical can cause irritation of the eyes and respiratory tract. It can also irritate the gastrointestinal tract if swallowed. It is combustible.

Summary Analysis:

- NATIONAL − In 2004, approximately 521,000 pounds of anthracene were reported. The quantity of anthracene decreased by approximately 200,000 pounds from 2000 to 2002, but increased in both 2003 and in 2004. Most of the increased quantity in 2004 was due to the wastes resulting from clean−up and cleanout of tanks at two facilities – one facility in Alabama that is being shutdown and from the cleaning of tanks and process equipment for a portion of a facility in Texas that is being shutdown.
- REGIONAL − In 2004, approximately 89 percent of the anthracene was reported by facilities in Regions 4 and 6, including 75 percent in Region 4.
- STATES − Although facilities in 19 states reported a PC quantity of anthracene in 2004, facilities in only three of these states (Kentucky, Alabama, and Texas) accounted for approximately 89 percent of the total PC quantity of anthracene.
- MANAGEMENT − Of the approximately 521,000 pounds of anthracene reported in 2004, 63 percent was treated, 25 percent was sent to energy recovery, and 13 percent was land disposed. Also, approximately 180,000 pounds of anthracene were recycled in 2004.
- FACILITIES − Of the 39 facilities that reported anthracene in 2004, one facility accounted for approximately 56 percent of the total quantity of this chemical. Seven of the 37 facilities accounted for approximately 95 percent of the total PC quantity of anthracene in 2004.
- INDUSTRY SECTORS − Facilities in five of the 10 industry sectors that reported anthracene in 2004 accounted for nearly all of the total quantity. Facilities in SIC 3334 (Primary aluminum) reported the highest quantity and accounted for approximately 56 percent of the total quantity of anthracene in 2004.

National Trends:

Exhibit 4.21 presents the total PC quantity (pounds) of anthracene for 2000−2004, showing the disposal, treatment, energy recovery, and recycling quantities. In 2004, approximately 521,000 pounds of anthracene were reported. The quantity of anthracene decreased by approximately 200,000 pounds from 2000 to 2002, but then increased in both 2003 and in 2004. Much of the increased quantity in 2003 can be attributed to a couple of facilities that had not previously reported anthracene. The increased quantity of anthracene reported in 2004 was primarily attributed to wastes generated from the clean−up and cleanout of tanks at a facility that is undergoing shutdown operations; complete shutdown is expected in 2008.

In 2004, 63 percent of the anthracene was treated, 25 percent was sent to energy recovery, and 13 percent was land disposed. From 2000 to 2002, energy recovery had been the primary method used to manage anthracene; in 2003, treatment became the predominant management method.

In 2004, approximately 180,000 pounds of anthracene were recycled. Over the five−year period of 2000−2004, recycling of anthracene reached a low point in 2003, but then increased by 33 percent in 2004.

Exhibit 4.21. National Management Methods for Anthracene

Management Method for Anthracene and Number of Facilities	2000	2001	2002	2003	2004	Percent Change (2000−2004)	Management Method −− Percent of Quantity of This PC (2004)
Number of Facilities	33	35	35	39	39	18.2%	-
Disposal Quantity (lbs.)	50,659	57,334	26,515	82,670	65,396	29.1%	12.6%
Energy Recovery Quantity (lbs.)	283,546	187,995	262,816	24,489	128,302	−54.8%	24.6%
Treatment Quantity (lbs.)	212,149	115,507	56,168	312,084	326,971	54.1%	62.8%
Priority Chemical Quantity (lbs.)	546,353	360,837	345,499	419,243	520,669	−4.7%	100%
Recycling Quantity (lbs.)*	227,555	378,568	377,582	134,490	178,851	−21.4%	-

*Note: Waste minimization is the emphasis of this Report. As such, we primarily focus on quantities of PCs that are managed via onsite/offsite disposal, treatment, or energy recovery because we believe these PC quantities offer the greatest opportunities for waste minimization. Because recycled quantities of PCs are already directed to their best uses, they are considered separate and distinct from the quantities of PCs not recycled. Throughout this section, the recycled quantity is presented to provide some perspective regarding the quantity of this PC already recycled compared to the quantities that are managed via disposal, treatment, and energy recovery and thus potentially available for waste minimization.

Exhibit 4.22. Distribution of Facilities Reporting Anthracene in 2004 and the Quantities of Anthracene Reported in 2004, by EPA Region

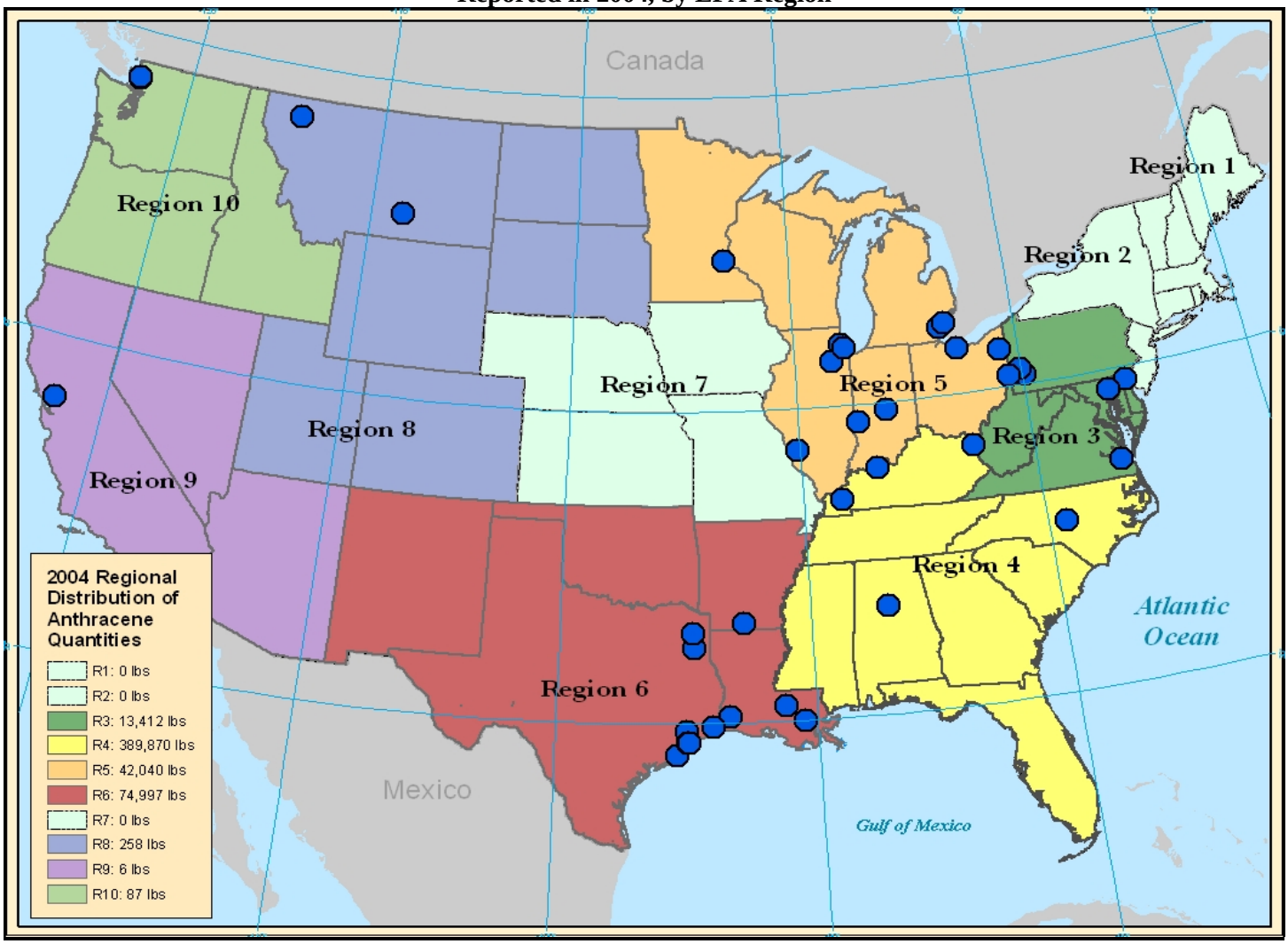


Exhibit 4.23 shows the number of facilities that reported anthracene within various quantity ranges. Of the 39 facilities that reported anthracene in 2004, one facility accounted for approximately 56 percent of the total quantity of this chemical. Seven of the 37 facilities accounted for approximately 95 percent of the total PC quantity of anthracene in 2004.

Exhibit 4.23. Distribution of Quantities by Facilities Reporting Anthracene, 2004

Anthracene (520,669 pounds)		
Quantity Reported	**Number of Facilities Reporting This Quantity (2004)**	**Percent of Total Quantity of This PC (2004)**
Up to 10 pounds	5	less than 0.1%
11 − 100 pounds	7	0.1%
101 − 1,000 pounds	14	0.8%
1,001 − 10,000 pounds	6	4.6%
10,001 − 100,000 pounds	6	38.3%
100,001 − 1 million pounds	1	56.2%
> 1 million pounds	0	0.0%

EPA Regional Trends:

Exhibit 4.24 shows the pounds of anthracene facilities reported for each EPA region from 2000 to 2004. In 2004, approximately 89 percent of the anthracene was reported by facilities in Regions 4 and 6, including 75 percent in Region 4. Facilities in Region 4 reported significant increases in both 2003 and in 2004. In Region 6, the quantity of anthracene more than doubled in 2004 from the previous year. Previous to 2004, facilities in Region 6 had shown a trend of steadily decreasing quantities of anthracene. The increase in 2004 was offset by another almost 50 percent decrease by facilities in Region 5 – for the second year in a row.

Exhibit 4.24. Quantity of Anthracene Reported by EPA Region, 2000−2004

EPA Region	2000 (pounds)	2001 (pounds)	2002 (pounds)	2003 (pounds)	2004 (pounds)	Percent Change in Quantity (2000−2004)	Percent of the Total Quantity of This PC (2004)
3	35,239	7,353	6,686	18,345	13,412	−61.9%	2.6%
4	4,229	2,869	4,090	276,556	389,870	9119.0%	74.9%
5	128,098	61,061	179,894	91,821	42,040	−67.2%	8.1%
6	378,757	289,097	154,488	31,882	74,997	−80.2%	14.4%
8	30	363	250	536	258	758.3%	0.0%
9	0	0	6	5	6	NA	0.0%
10	0	94	85	98	87	NA	0.0%
Total	**546,353**	**360,837**	**345,499**	**419,243**	**520,669**	**−4.7%**	**100.0%**

Exhibit 4.25 shows how facilities managed anthracene within each EPA region in 2004. Most of the PC quantity of anthracene was treated onsite, particularly by facilities in Region 4. However, facilities in Region 4 also used energy recovery to manage a significant quantity of anthracene. Offsite disposal was the primary means of managing anthracene in Regions 3 and 5. Facilities in Regions 4 and 5 reported most of the recycled anthracene in 2004.

Exhibit 4.25. Regional Management Methods for Anthracene, 2004

EPA Region	Quantity of Anthracene (2004)	Percent of Total Quantity of Anthracene (2004)	Disposal (pounds)		Energy Recovery (pounds)		Treatment (pounds)		Recycling (pounds)	
			Onsite Disposal	Offsite Disposal	Onsite Energy Recovery	Offsite Energy Recovery	Onsite Treatment	Offsite Treatment	Onsite Recycling	Offsite Recycling
3	13,412	2.6%	0	10,078	0	48	1,111	2,175	246	9,700
4	389,870	74.9%	10	23,829	0	74,250	291,761	20	70,000	70,000
5	42,040	8.1%	0	27,509	0	10,070	3,781	680	24,308	0
6	74,997	14.4%	57	3,654	40,630	3,300	3,016	24,340	0	4,513
8	258	0.0%	258	0	0	0	0	0	84	0
9	6	0.0%	0	2	0	0	0	4	0	0
10	87	0.0%	0	0	4	0	75	8	0	0
Total	**520,669**	**100.0%**	**325**	**65,072**	**40,634**	**87,668**	**299,744**	**27,227**	**94,638**	**84,213**

State Trends:

Exhibit 4.26 shows the quantity of anthracene in the 21 states where facilities reported this chemical between 2000 and 2004. Although facilities in 19 states reported a PC quantity of anthracene in 2004, facilities in only three of these states (Kentucky, Alabama, and Texas) accounted for approximately 89 percent of the total PC quantity of anthracene.

Some additional highlights are:

- Although Texas facilities reported an increased quantity in 2004, there was an 81 percent reduction since 2000. Compared to 2003 quantities, the quantity of anthracene increased in each of these three states in 2004. Approximately 19,000 pounds of anthracene was due to wastes generated from the cleaning of tanks and process equipment for a portion of a facility in Texas that is being shutdown.
- An additional 90,000 pounds − most of the increase reported in 2004 − was due to the wastes resulting from clean−up and cleanout of tanks at a facility in Alabama that is being shutdown.
- Facilities in a number of states, including Michigan and Illinois, reported significant decreases, compared to quantities reported in 2003. The shutdown of a facility in Michigan and the switch by a facility in Illinois to a different wash−oil stream that did not contain anthracene were the primary reasons for the decrease in 2004.

Exhibit 4.26. State Quantity Trends for Anthracene, Based on Largest 2004 Quantity, 2000−2004

State	Total Quantity (pounds) of Anthracene					Change in Quantity (2000−2004)	Percent Change in Quantity (2000−2004)	Percent of Total Quantity of This PC (2004)
	2000	2001	2002	2003	2004			
KY	1,004	962	1,878	270,887	293,787	292,783	29161.7%	56.4%
AL	3,201	1,827	2,176	5,551	96,000	92,799	2899.1%	18.4%
TX	373,863	275,398	144,427	26,466	71,061	−302,802	−81.0%	13.6%
MI	0	0	888	57,719	23,466	23,466	NA	4.5%
IL	14,963	2,560	9,372	33,573	17,770	2,807	18.8%	3.4%
WV	33,527	6,029	4,300	10,190	8,297	−25,230	−75.3%	1.6%
PA	1,712	1,319	2,380	7,652	4,746	3,034	177.2%	0.9%
LA	4,818	13,638	9,959	5,281	3,740	−1,078	−22.4%	0.7%
OH	112,814	58,486	169,615	381	632	−112,182	−99.4%	0.1%
MT	0	250	250	535	258	258	NA	0.0%
VA	0	0	3	274	239	239	NA	0.0%
AR	76	61	102	135	196	120	157.9%	0.0%
IN	68	12	18	143	150	82	120.6%	0.0%
MD	0	0	0	203	120	120	NA	0.0%
WA	0	94	85	98	87	87	NA	0.0%
NC	24	80	36	118	83	59	244.6%	0.0%
MN	253	3	1	5	22	−231	−91.3%	0.0%
DE	0	5	3	26	10	10	NA	0.0%
CA	0	0	6	5	6	6	NA	0.0%
ND	0	2	0	1	0	0	NA	0.0%
UT	30	111	0	0	0	−30	−100.0%	0.0%
Total	**546,353**	**360,837**	**345,499**	**419,243**	**520,669**	**−25,684**	**−4.7%**	**100.0%**

Exhibits 4.27, 4.28, and 4.29 illustrate the trends in quantities of anthracene in the five states where facilities reported 96 percent of total quantity from 2000 to 2004.

Exhibit 4.27. Trends in Anthracene Quantities Reported in Michigan, Illinois, and Kentucky, 2000−2004

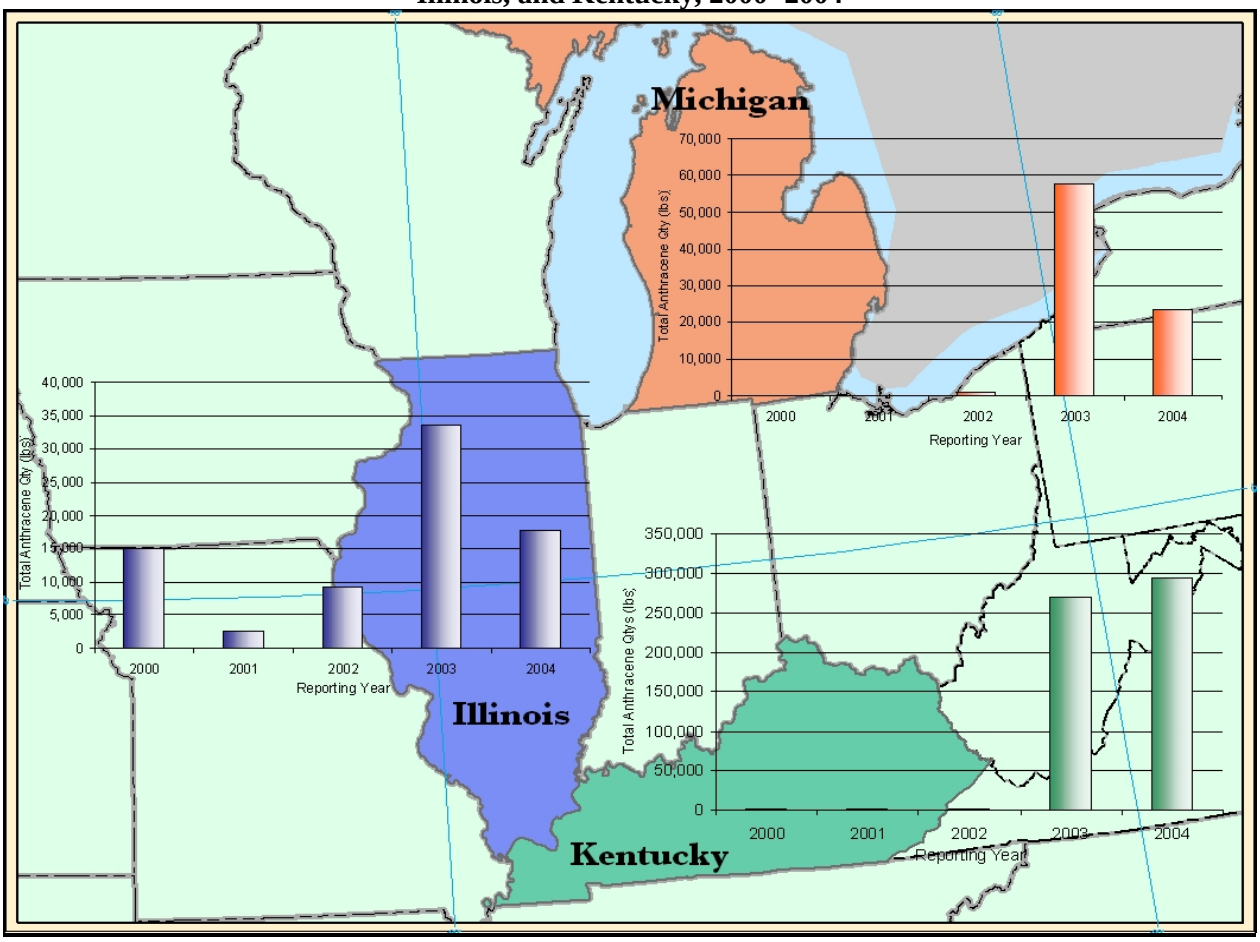


Exhibit 4.28. Trends in Anthracene Quantities Reported in Alabama, 2000−2004

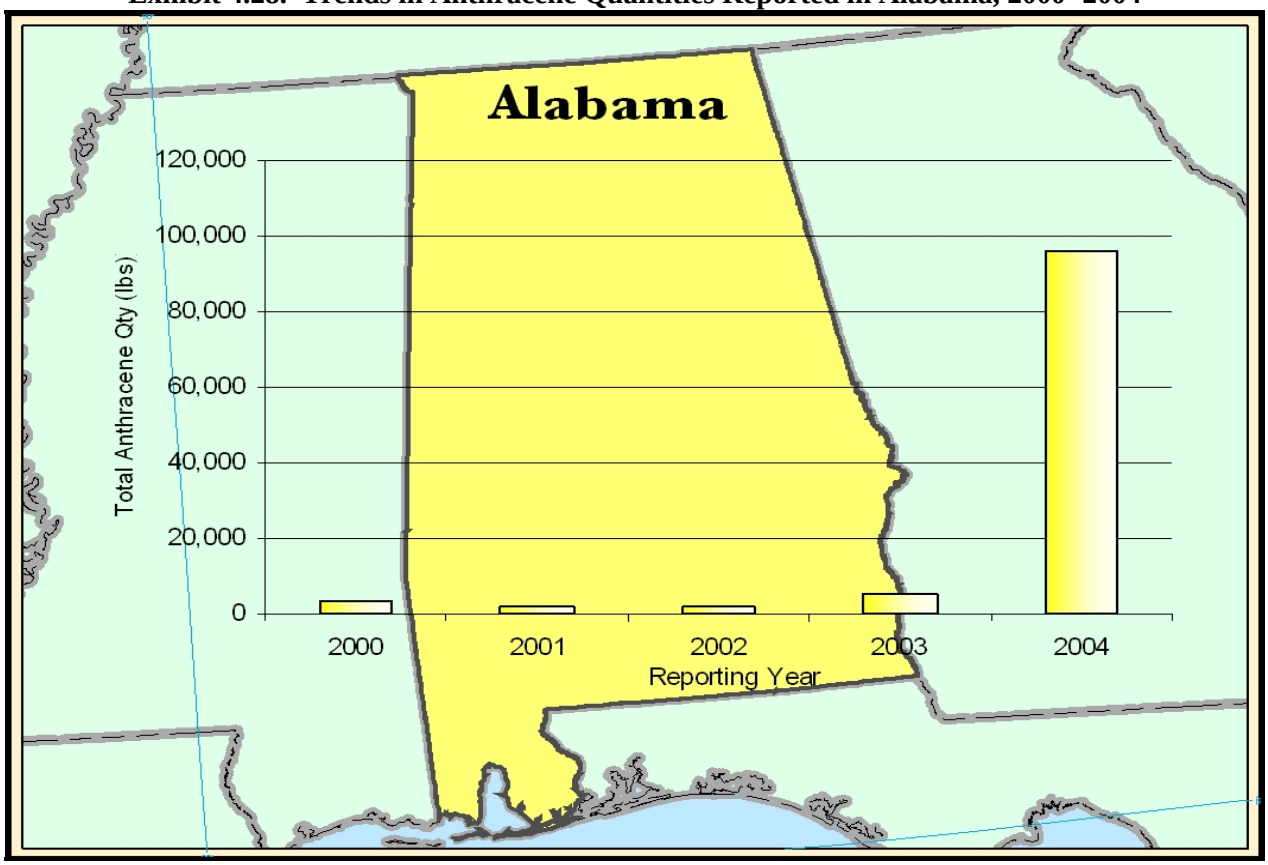


Exhibit 4.29. Trends in Anthracene Quantities Reported in Texas, 2000−2004

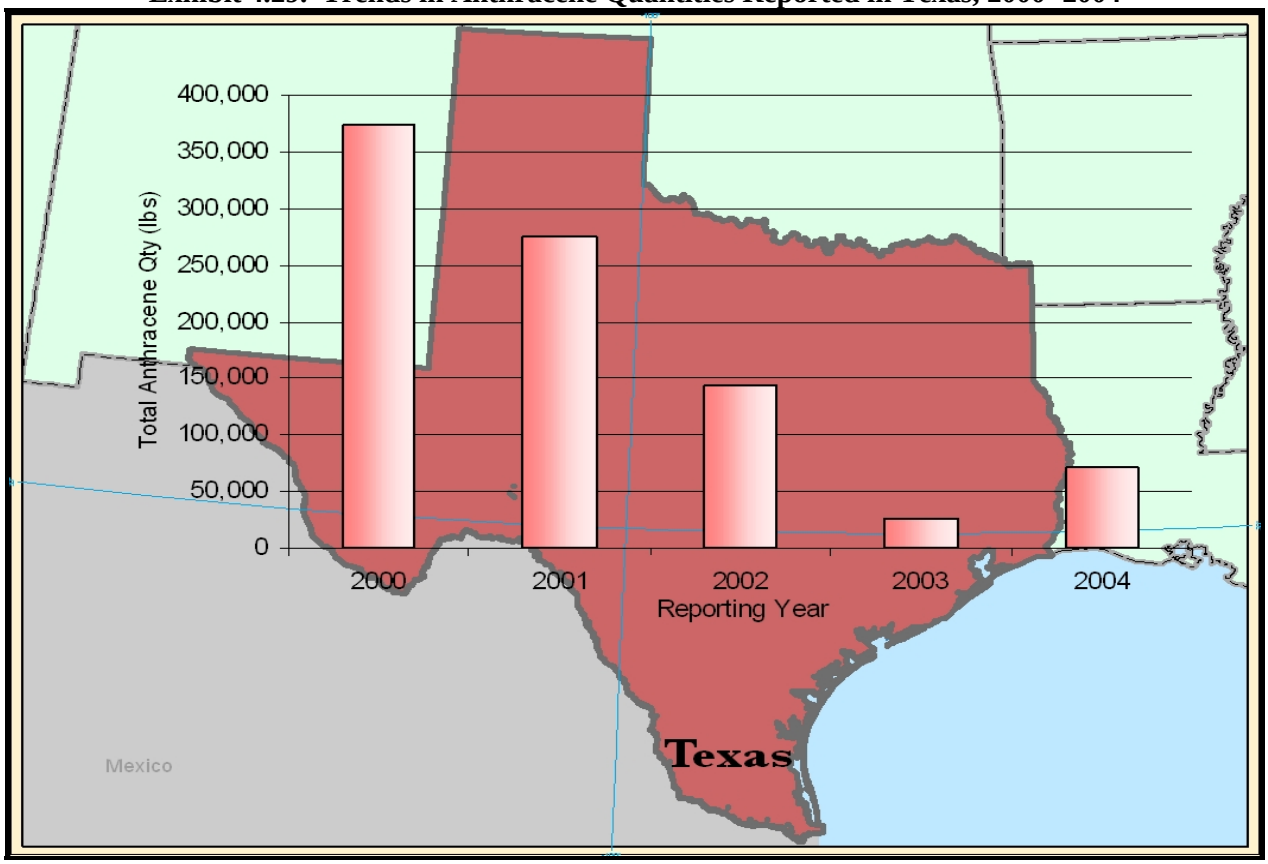
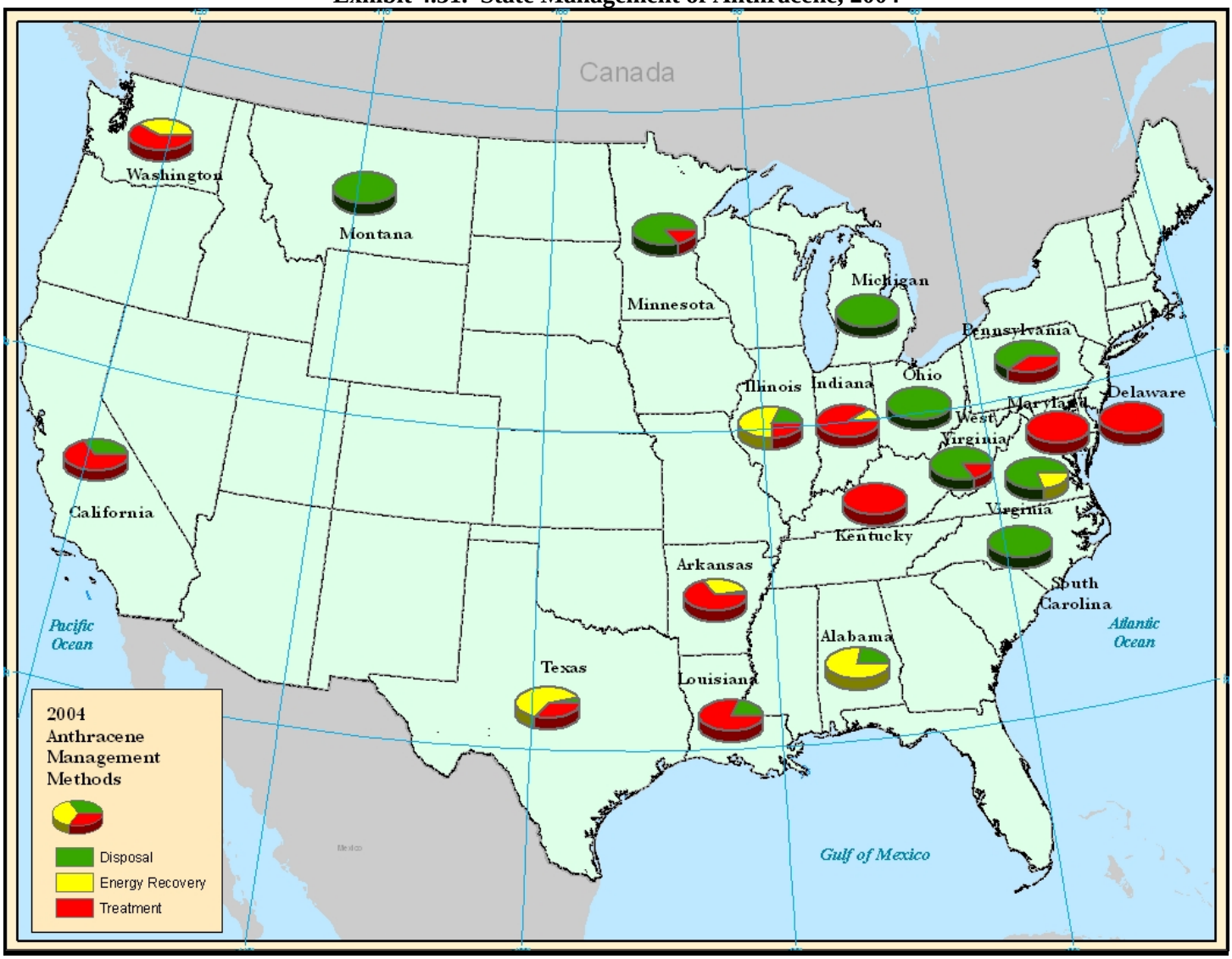


Exhibit 4.30 shows how anthracene was managed by facilities in the five states that accounted for approximately 96 percent of the total quantity of this PC in 2004. Most of the anthracene was treated, primarily onsite, especially by facilities in Kentucky. Energy recovery was the primary method used by facilities in Alabama and Texas. Michigan facilities sent their anthracene to land disposal. Recycling of notable quantities occurred in Kentucky and Alabama.

Exhibit 4.30. Management Methods for Anthracene, Facilities in States With 96 Percent of Total Quantity, 2004

State	Total Quantity of Anthracene (2004)	Onsite Disposal (pounds)	Offsite Disposal (pounds)	Onsite Energy Recovery (pounds)	Offsite Energy Recovery (pounds)	Onsite Treatment (pounds)	Offsite Treatment (pounds)	Onsite Recycling (pounds)	Offsite Recycling (pounds)
KY	293,787	10	1,746	0	250	291,761	20	70,000	0
AL	96,000	0	22,000	0	74,000	0	0	0	70,000
TX	71,061	57	2,926	40,630	3,240	90	24,118	0	4,513
MI	23,466	0	23,466	0	0	0	0	0	0
IL	17,770	0	3,390	0	10,056	3,777	547	2,400	0

Exhibit 4.31. State Management of Anthracene, 2004



Industry Sector (SIC) Trends:

Exhibit 4.32 shows the pounds of anthracene reported by facilities in 14 industry sectors (SIC codes) from 2000 to 2004. Facilities in five of the 10 industry sectors that reported anthracene in 2004 accounted for nearly all of the total quantity. Facilities in SIC 3334 (Primary aluminum) reported the highest quantities, accounting for approximately 56 percent of the total PC quantity of anthracene reported in 2004. One facility in this sector, located in Kentucky, began reporting anthracene in 2003 and accounted for approximately 99 percent of the quantity for SIC 3334.

Facilities in SICs 2865 (Cyclic crudes and intermediates) and 2869 (Industrial organic chemicals, nec) reported large increases in 2004. One facility, in each of these two industry sectors, accounted for most of the increased quantity in 2004. In both cases, the increased quantity of anthracene resulted from shutdown activities – wastes resulting from the cleanout of tanks and other process equipment.

The large decrease reported by the facility in SIC 2821 (Plastic materials and resins) resulted from a switchover to a different wash−oil stream in 2004 that did not contain anthracene.

Exhibit 4.32. Industry Sectors Reporting Anthracene, 2000−2004

Primary SIC	SIC Description	Number of Facilities That Reported Anthracene (2004)	2000 (pounds)	2001 (pounds)	2002 (pounds)	2003 (pounds)	2004 (pounds)	Change in Quantity (2000− 2004)	Percent of Total Quantity of This PC (2004)
3334	Primary aluminum	2	0	250	250	269,580	292,696	292,696	56.2%
2865	Cyclic crudes and intermediates	6	165,658	69,965	186,745	83,230	144,893	−20,765	27.8%
2869	Industrial organic chemicals, nec	8	203,848	96,761	79,703	32,096	73,299	−130,549	14.1%
3312	Blast furnaces and steel mills	3	339	117	354	7,866	5,128	4,789	1.0%
2911	Petroleum refining	12	2,067	5,619	6,659	2,037	3,405	1,338	0.7%
3272	Concrete products, nec	3	0	0	1,638	1,469	632	632	0.1%
2851	Paints and allied products	1	0	0	0	168	250	250	0.0%
4925	Gas production and/or distribution	1	5	5	1	136	136	131	0.0%
2821	Plastics materials and resins	1	0	0	0	22,536	134	134	0.0%
2491	Wood preserving	2	80	87	53	125	97	17	0.0%
2812	Alkalies and chlorine	0	93,600	168,814	0	0	0	−93,600	0.0%
2819	Industrial inorganic chemicals, nec	0	80,504	18,968	70,096	0	0	−80,504	0.0%
2822	Synthetic rubber	0	2	1	0	0	0	−2	0.0%
2952	Asphalt felts and coatings	0	250	250	0	0	0	−250	0.0%

Exhibit 4.33 shows how anthracene was managed by facilities in the five industry sectors that accounted for over 99 percent of the total quantity of this PC in 2004. Most of the anthracene was treated, primarily onsite, particularly by facilities in SIC 3334 (Primary aluminum). Facilities in the SIC 2865 (Cyclic crudes and intermediates) industry sector primarily sent the anthracene to offsite energy recovery and offsite disposal. Facilities in SIC 2865 (Cyclic crudes and intermediates) and SIC 2869 (Industrial organic chemicals, nec) accounted for most of the recycling of anthracene in 2004.

Exhibit 4.33. Management Methods for Anthracene in Industry Sectors With 99 Percent of Total Quantity, 2004

Primary SIC	SIC Description	Total Quantity of Anthracene (2004)	Percent of Total Quantity (2004)	Disposal (pounds)		Energy Recovery (pounds)		Treatment (pounds)		Recycling (pounds)	
				Onsite Disposal	Offsite Disposal	Onsite Energy Recovery	Offsite Energy Recovery	Onsite Treatment	Offsite Treatment	Onsite Recycling	Offsite Recycling
3334	Primary aluminum	292,696	56.2%	229	1,746	0	0	290,721	0	84	0
2865	Cyclic crudes and intermediates	144,893	27.8%	0	55,291	0	83,922	4,882	798	2,400	70,000
2869	Industrial organic chemicals, nec	73,299	14.1%	50	2,333	40,630	3,240	3,275	23,771	70,000	4,513
3312	Blast furnaces and steel mills	5,128	1.0%	0	3,323	0	0	1	1,804	170	9,700
2911	Petroleum refining	3,405	0.7%	46	1,532	4	358	864	601	426	0